A SPURIOUS EXPERIMENT.

PREFATORY NOTE.

As the experiment referred to in this paper continues to be misrepresented as being sound to the detriment of antimalarial work in India and elsewhere, I think it advisable to reprint my original criticisms of the affair for those who are interested. So far as I know no reply to these criticisms has ever been made.

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REPORT ON THE MEASURES TAKEN AGAINST MALARIA IN THE LAHORE (MIAN MIR) CANTONMENT.

To the Editor of THE LANCET.

SIR,—In your issue of Oct. 29th you deal with this publication, which is the report of a Committee appointed by the Government of India in October, 1909, to investigate a so-called experiment which has been carried out for several years to test the practical applicability of mosquito reduction. The report is now under exhaustive analysis; but, as it may injure the cause of sanitation among those who are not acquainted with such matters, I trust that you will kindly publish the following summary of the criticisms which I have to make regarding it.

1. In paragraph 11 of the report, the object of the experiment is described as being to test the doctrine that malaria can be banished by mosquito reduction anywhere at very little cost. This absurd proposition is fixed upon me by means of quotations taken from my writings and separated from their context. What I taught was that mosquito reduction may be comparatively easy and inexpensive under very favourable circumstances; and this has proved to be the case at Ismailia, Athens, and other places.

2. In paragraph 10 the Committee give the misleading impression that Mian Mir was selected for the experiment only after a careful review of other

stations in India. As a matter of fact, the gentlemen who chose it had spent only a few months in India, and were directed to Mian Mir from Simla. The place proved to be an exceptionally difficult one, because it is absolutely flat, has an impervious subsoil, and becomes practically a large marsh during the rains.

3. The first operations of 1902–03 were destructively criticised by several writers, including myself.[1] But the Committee accept the soundness of the work without attempting to answer our objections.

4. More extensive measures were adopted under General Kitchener in 1904–05, by cutting off the irrigation system and filling in pits and depressions; but the Committee fail to demonstrate the essential point—namely, whether anything approaching the same thoroughness was shown during the four years from then up to the date of their visit in 1909. On the other hand, they admit that the work was incomplete; that "the military authorities dealt only with breeding places lying within the inhabited portion of the cantonment or situated fairly closely to it"; and that the officers employed frequently complained of the inadequacy of the working staff, especially during the rainy (i.e., the malaria) season. They omit to give exact details, month by month and year by year, of the number of men employed and the work actually done, even during the year of their visit. They describe the large use made of military labour, but I gather that this was employed only in 1904–05. They state that an "immense amount has been done to abolish the breeding places of *Anopheles* mosquitoes," but give no figures as to the approximate degree of the sterilisation—was it a quarter, a half, or three-quarters? They did not make their visit until a month after the rains had ceased—that is, at a time when they could not possibly have observed fully for themselves the incompleteness of the measures (though even then breeding places remained). Their evidence was therefore mostly obtained from witnesses whose statements are not given *verbatim*. On the other hand, a writer

[1] Brit. Med. Jour., Dec. 17th, 1904, and Journal of the Royal Army Medical Corps, August, 1904, and July, 1905.

who has recently visited the place says [2] that "no attempt whatever is made to prevent the establishment of breeding places within the courts of the houses," and that, "excellent as they are, the measures hitherto adopted are by no means complete, and cannot be taken as any indication of the final potentialities of anti-malarial sanitation in the locality."

5. Exact accounts of the expenditure, month by month and year by year, would have revealed the sufficiency of the operations—or, perhaps, their great insufficiency during recent years. The Committee state, however, that they cannot "give even an approximate estimate of the total cost of the operations." Yet this was supposed to be a practical experiment! Surely they might have furnished the details for the year or two preceding their visit. We learn that Rs.33,849 (about £2256) were spent in connexion with the operations of 1904–05, mostly on obliterating the irrigation system. This was a measure of doubtful utility, since an excellent irrigation system is now maintained without mosquito breeding at Ismailia, so that it is open to question whether most of this expenditure with its contingent loss of revenue (not clearly given) should be included in the bill. The reform of the surface drainage in 1905 cost Rs.40,000 (£2666), but much of this was required for ordinary sanitary purposes. All we are clearly told is that "from 1906–07 onwards a total sum of Rs.14,594 has been spent from contonment funds on various anti-malarial operations"—no exact details. We learn, however, from Colonel Rowan, R.A.M.C., who actually supervised the work, that "the diversion of the canal entailed a loss of revenue to the cantonment fund of about Rs.6000 yearly, and the actual filling in of the canal cuttings and the digging of wells to replace them, together with some minor sanitary improvements, cost about Rs.15,000. Since 1905 the cantonment fund has granted annually Rs.1000 for anti-malarial work." [3] Hence it appears that since 1905 the princely sum of £66 a year was

[2] Journal of Tropical Medicine, May 16th, 1910.

[3] Journal of the Royal Army Medical Corps, September, 1908.

allowed for the work. This, be it remembered, for a difficult country of eight square miles occupied by five regiments and a total population of 16,000 people! The sum amounts to 1 anna (about 1*d.*) per head of population and 1·7 per cent. of the annual income of the cantonment (Rs.60,000), and explains the inadequacy of the working staff complained of by the local officers (who, I should add, were not in any way to blame for it). Would any practical sanitarian admit that any disease like malaria could be eradicated from such a place for such a sum? The whole thing is not a fair test of my proposals and amounts to nothing more than a travesty of them.

6. Nevertheless, wonderful to relate, as shown by Chart I of the report, the statistics demonstrate an extremely low malaria-rate among the troops, especially during 1904–07, when the operations were most thoroughly conducted. The Committee attempt to parry this fact by arguing that a similar decline has occurred in other stations, especially Amritsar, where they say anti-malarial operations have not been adopted "on a large scale." But they did not visit these places and give no facts to prove that no anti-malarial operations were adopted in them. I am therefore free to maintain, pending further and more reliable analysis, that the general improvement, including that at Mian Mir, was due to precisely similar partial measures carried out by the military —namely, improved drainage, partial mosquito reduction, and partial quinine prophylaxis. If they prove anything (which is doubtful), the Committee's facts prove just the opposite to their conclusions— they suggest that the trifling expenditure of 1 anna per head has been at least accompanied at Mian Mir by an exceptionally low malaria-rate.

The Committee's figures will be much criticised. They omit to describe changes among the bodies of troops and the effect of the outlying post of Fort Lahore, said to be an intensely malarious spot. Both of these factors should largely increase the malaria-rate at Mian Mir. The figures for the native population cannot be accepted without consideration of many factors not mentioned in the report. Deaths and invalidings among the troops are not given.

7. It will be agreed that for a cost of 1 anna a head no sweeping reduction of mosquitoes and malaria, such as occurred at Ismalia, could be expected, especially just after a heavy rainy season. The Committee's own efforts (lasting six days) to measure the variation by means of the most grotesquely insufficient random sampling are not capable of detailed examination in this brief review. For example, in the British Infantry Bazaar, enlarged spleen was found in 20 out of 25 children examined in 1901, and in 17 out of 24 children examined in 1909. They gravely put down (p. 31) the corresponding percentages as being 80 per cent. and 71 per cent. respectively, and then argue that this shows no great reduction. But the statistical errors are respectively 22 per cent. and 26 per cent., so that the variation may have been anything from an increase of 39 per cent. to a decrease of 65 per cent., and in the latter case the reduction would have been very great. Similarly with the other samplings, and, owing to close localisation of malaria and to the neglect of the courts of the houses just mentioned, each sample must be taken by itself. The Committee are so oblivious of these matters that they sometimes omit even to give the actuals at all. In 1904 I exposed the utter untrustworthiness of these methods and those employed for estimating the number of mosquitoes; but the Committee repeat the blunders without answering my criticisms—a thing which amounts merely to an appeal *ad ignorantiam*.

8. Perhaps the most "colossal blunder" in the report is the omission of all reference to the *cost of the disease*. The fundamental economical principle of malaria reduction is that it will reduce that cost. For deaths, invaliding, medical upkeep, loss of service, and of military efficiency among the 4000 soldiers at Mian Mir, malaria must cost Government directly a very large annual expenditure. Each British soldier is said to be worth £100 to Government, and each invaliding and sick furlough to England costs, I suppose, quite £50; so that Rs. 100,000 a year (about £6666) would probably be a low estimate for the cost of a disease which has caused an admission-

rate of 100 to 300 per cent. of strength in the station. And what must be the cost to the large civil population? I doubt whether the whole expense of the Mian Mir work from its beginning has equalled half the cost of the disease during a single year. If the disease costs Government Rs.25 a year for each soldier there, the 1 anna a head which has apparently been recently devoted to prevention is only 1/400th part of that cost. But all this is absolutely ignored, not only in this report, but in all the previous official reports on this subject, the pretence being that the few pence a head required for mosquito reduction are much more than can be afforded.

9. The Committee's scanty account of campaigns outside India is mostly derived from occasional papers, and largely from mine. It makes no attempt to analyse either the results or the cost. Prof. Osler has already adjusted their statements regarding Panama.[4] Colonel Gorgas says in his contribution to my recent book on the prevention of malaria that mosquito reduction costs $2 a head of population in Panama; but the cost of labour there is probably four or five times what it is in India, and the campaign was waged against yellow fever as well as malaria, and is much more sweeping than I ever suggested for India. The other campaigns are treated in the same manner. No attempt is made to extricate the facts for the purpose of a worthy review of the subject, and one would think that the Indian sanitary officials have never tried to ascertain these facts for themselves by special inquiry.

10. The greatest credit must be given to the military medical officers at Mian Mir for the manner in which they conducted the work with the small pittance allowed them for it. They frequently pointed out in recent years the necessity for more funds (their complaints are mentioned in the report), but none were granted. Thus, though malaria cost Government, say, Rs.100,000 a year, the utmost that "economical administration" could allow for its prevention was, say, Rs.1000 a year. I see, however, from p. 5 of the report that the authorities

[4] THE LANCET, Oct. 8th, 1910.

did not hesitate to spend Rs.218,000 for an additional water-supply, which, however, turns out to be brackish! One can, therefore, spend 2 lacs for brackish water and 1 lac a year on account of malaria, but £66 a year is, in the sense of the Committee, an inordinate expenditure for attempting to control that disease. The question arises whether the whole Indian sanitary system does not require, not reformation, but revolution. When we note further that the pay of a single senior Indian official is often Rs.2000 a month, and that this will pay for 200 coolies at Rs. 10 a month each, and that the permanent petrolage gang at Mian Mir seems to have fallen in 1909 to *four men and a hospital assistant* (p. 19), we shall, I think, conclude that this question is perhaps the most urgent one at present for India.

So much for Mian Mir. I think that all those who are interested in the saving of human life on a large scale would like to ask the following questions regarding the matter. Here we have a so-called experiment carried out to test a new sanitary measure proposed for the prevention of a disease which in India alone causes every year at least 1,000,000 deaths and, say, 100,000,000 cases of illness. Why, then, was not the experiment supported by the Imperial Government with sufficient funds (in addition to the miserable dole allotted from the cantonment fund) to ensure at least some genuine attempt at marked success? Why were not the measures of 1904–05 continued and maintained? Why were no exact records kept (or at least published) of the number of men employed, the work done, and the money spent month by month and year by year since then? Why, instead of the admittedly faulty military statistics, were not accurate measurements made by proper methods of the fluctuating amont of malaria in the place? Why is there no mention of the cost of the disease? And why were no efforts made to obtain accurate accounts of other campaigns? As, moreover, the whole affair was admittedly undertaken to test proposals attributed to me, would it not have been more courteous to have consulted me sometimes on the matter, instead of publishing under the sanction of the Government of India report after

report full of omissions, hasty observations, and ill-considered conclusions which can only mislead the ignorant on a matter of life and death to millions? If I were to maintain that the whole affair was meant, not to test my proposals, but to discredit them, it would be difficult to refute me. It is easy to allow any experiment to fail if we wish it to do so.

But it is no longer possible to take the matter seriously. The reports are too clearly lacking in precision either of fact or of thought to be capable of adding anything to our knowledge of the subject. The whole point of the alleged experiment was really to compare the cost of the disease with the cost of its prevention; but the Committee have entirely ignored the former point and have admitted their inability to give "even an approximate estimate" of the latter one, and the result is therefore an absolute zero. Mian Mir proves nothing. If it *suggests* anything, it suggests that a trifling expenditure of 1 anna a head per annum was, as I have said, associated even there with a considerable fall in the malaria-rate. The Government of India have evidently been misled into the belief that mosquito reduction will ruin them and are therefore trying hard to escape from the responsibility; but the practical feasibility of the measure is now too well established by sound work elsewhere to be dismissed by such extraordinary hebetudes as are contained in these publications. I hope to discuss elsewhere the general question of malaria prevention in India.

I am, Sir, yours faithfully,

RONALD ROSS.

University of Liverpool, Nov. 1st, 1910.